Assignment3

- You have two weeks to solve this assignment on OJ

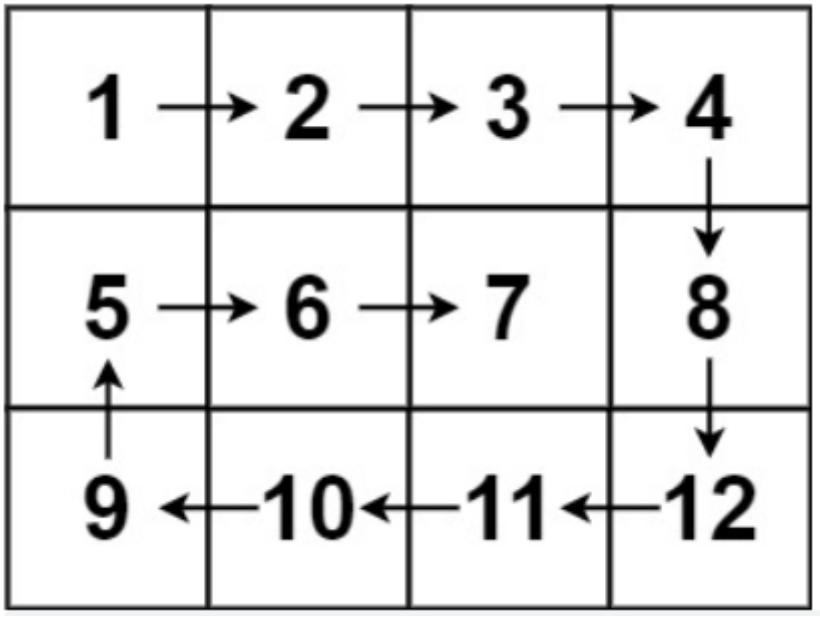
Problem A: Inverse serpentine matrix

Description

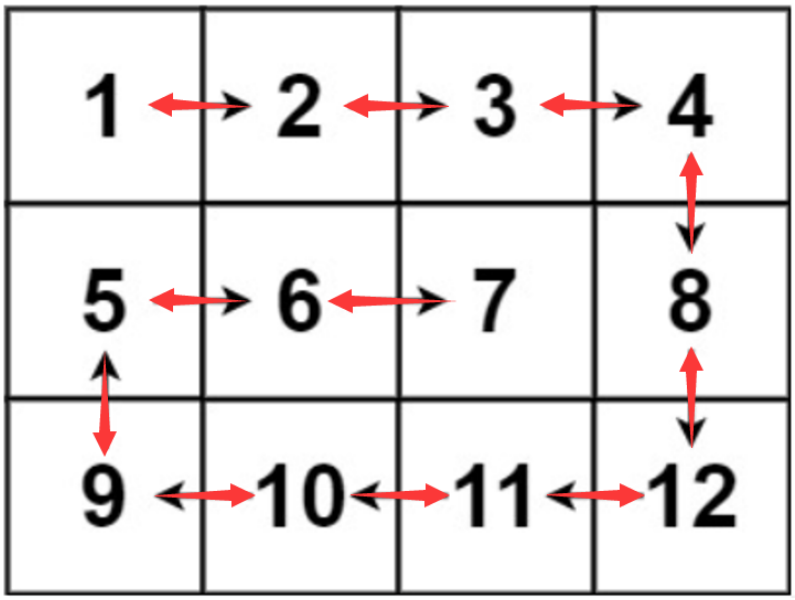
Traverse the matrix in a snake-like clockwise order. Then reverse the output.

Refer to the diagram below.

- Traverse:



- Output:



Input

For the first line, there are two numbers `m` and `n` indicating the number of rows and columns of the array.

For next `m` lines, there are `n` numbers in each line indicating the elements of the array in each row .

`m`<=10 and `n`<=10

Elements in the array are less than 10000.

Output

Output the inverse serpentine of the input array.

Example

Input

```
3 4
1 2 3 4
5 6 7 8
9 10 11 12
```

Output

```
7 6 5 9 10 11 12 8 4 3 2 1
```

Problem B: Matrix multiplication

Description

Try matrix multiplication.

If A is a matrix of M * P and B is a matrix of P * n, then matrix C of M * n is the product of matrices A and B, where the elements in row i and column j of matrix C can be expressed as:

$$A = \begin{bmatrix} a_{1,1} & a_{1,2} & a_{1,3} \\ a_{2,1} & a_{2,2} & a_{2,3} \end{bmatrix}$$

$$B = \begin{bmatrix} b_{1,1} & b_{1,2} \\ b_{2,1} & b_{2,2} \\ b_{3,1} & b_{3,2} \end{bmatrix}$$

$$C = AB = \begin{bmatrix} a_{1,1}b_{1,1} + a_{1,2}b_{2,1} + a_{1,3}b_{3,1}, & a_{1,1}b_{1,2} + a_{1,2}b_{2,2} + a_{1,3}b_{3,2} \\ \\ a_{2,1}b_{1,1} + a_{2,2}b_{2,1} + a_{2,3}b_{3,1}, & a_{2,1}b_{1,2} + a_{2,2}b_{2,2} + a_{2,3}b_{3,2} \end{bmatrix}$$

Input

For the first line, there is a number `N` means the number of matrices.

For next `N` lines, there are 2 numbers `m` and `n` in each line, indicating the number of rows and columns of each array.

For each next `Mi` lines, there are `Ni` numbers in each line indicating the elements of the array in `i`th row .

You need to do matrix multiplication in the input order.

- eg: If there 3 matrices A,B and C in the input, you need to do A*B*C =D.

`N`<=10 , `m`<=20 and `n`<=20 .

Elements in the array are less than 100.

Output

Output the result you get.

- **!!!!!!** In order to avoid overflow, don't forget to **mod** 514329 at each step.

Example

Input

```
3
2 1
1 2
2 2
3
8
2 1
7 1
2 1
```

Output

```
48 9
128 24
```

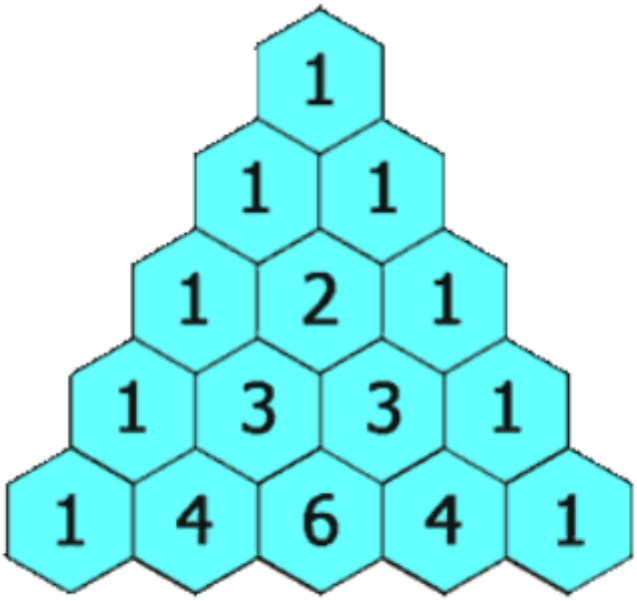
Problem C Reverse Yang Hui Triangle

Description

Given a non-negative integer N, generate the first N rows of the 'Yang Hui triangle'. and output them in reverse order.

In the Young Fai triangle, each number is the sum of the numbers to its upper left and upper right

- From https://baike.baidu.com/item/%E6%9D%A8%E8%BE%89%E4%B8%89%E8%A7%92/215098



Input

The first line is an integer n, which means there are n rows in the triangle.

`n` <=20.

Output

Output your Yang Hui triangle from bottom to top and right to left.

Sample Input

```
5
```

Sample Output

```
1 4 6 4 1
1 3 3 1
1 2 1
1 1
1
```

Problem D Let's play Othello!

Description

Othello is a relatively simple board game. Players take turns placing pieces on the board with their assigned color facing up. During a play, any piece of the opponent's color that is in a straight line and bounded by the piece just placed and another piece of the current player's color are turned over to the current player's color.

The only rule of Othello is to flip the opponent's pieces every time. You must flip at least one of your opponent's pieces in each round, otherwise you will have no place to put down your pieces.

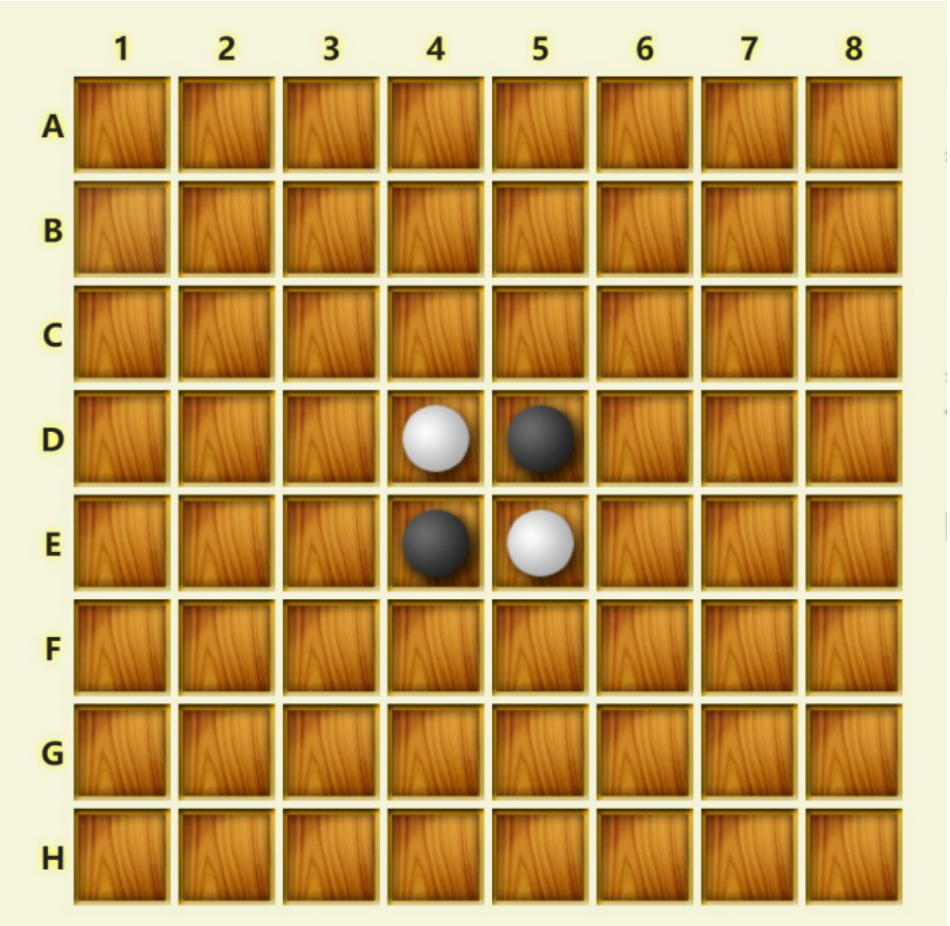


Fig 1 Othello chessboard

Today, Jimmy and Alpaca are playing Othello. Jimmy wants to win, but he is very lazy. Please help him find the position on the chessboard where he can put his pieces.

- Othello rule:

  The board consists of 8 rows and 8 columns with 64 squares. At the start of the game, the 4 squares in the centre of the board are placed first with 4 pieces separated by black and white (some variations are placed next to each other). Usually the black discs go first. Both players take turns to play. As long as the discs are on a line (horizontal, straight or diagonal) with one of your own discs on the board, you can convert those discs to your side (by flipping them over). If a disc in either position fails to catch any of the opponent's discs, the opponent must be allowed to move. When neither player can make a move, the game ends and the player with the most discs wins.
- From https://zh.wikipedia.org/wiki/%E9%BB%91%E7%99%BD%E6%A3%8B

Input

The first line is an integer `n`, which means there are `n` test cases.

For each test case, the first line contains one integer `1` or `-1` which means the color Jimmy used.

(1 for white, -1 for black. Obviously, if Jimmy uses white, Alpaca will use black. If Jimmy uses black, Alpaca will use white).

The next eight lines of input have eight integers per line. Start from (0,0) to (7,7).

Represents an 8x8 chessboard with values of 1, - 1 or 0. (Again, 1 is white, - 1 is black, and 0 is empty).

`n` <=5

Output

Output a 8*8 array. For each element in the array, if you can put down chess then output 1, else output 0.

If Jimmy has have no place to put down chess,just output -1.

Sample Input

```
3
-1
0  0  0  0  0  0  0  0
0  0  0  0  0  0  0  0
0  0  0  0  0  0  0  0
0  0  0  1 -1  0  0  0
0  0  0 -1  1  0  0  0
0  0  0  0  0  0  0  0
0  0  0  0  0  0  0  0
0  0  0  0  0  0  0  0
1
0  0  0  0  0  0  0  0
0  0  0  0  0  0  0  0
0  0  0 -1  0  0  0  0
0  0  0 -1 -1  0  0  0
0  0  0 -1  1  0  0  0
0  0  0  0  0  0  0  0
0  0  0  0  0  0  0  0
0  0  0  0  0  0  0  0
-1
1  1  1  1  1  1  1  1
1  1  1  1  1  1  1  1
1 -1 -1 -1 -1 -1 -1  1
1 -1 -1 -1 -1 -1 -1  1
0  0 -1 -1 -1 -1 -1  1
0  0  0  0  0  0 -1  1
0  0  0  0  0  0  0  0
0  0  0  0  0  0  0  0
```

Sample Output

```
0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0
0 0 0 1 0 0 0 0
0 0 1 0 0 0 0 0
0 0 0 0 0 1 0 0
0 0 0 0 1 0 0 0
0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0
0 0 1 0 1 0 0 0
0 0 0 0 0 0 0 0
0 0 1 0 0 0 0 0
0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0
-1
```

Problem E Let's play Othello again!

Description

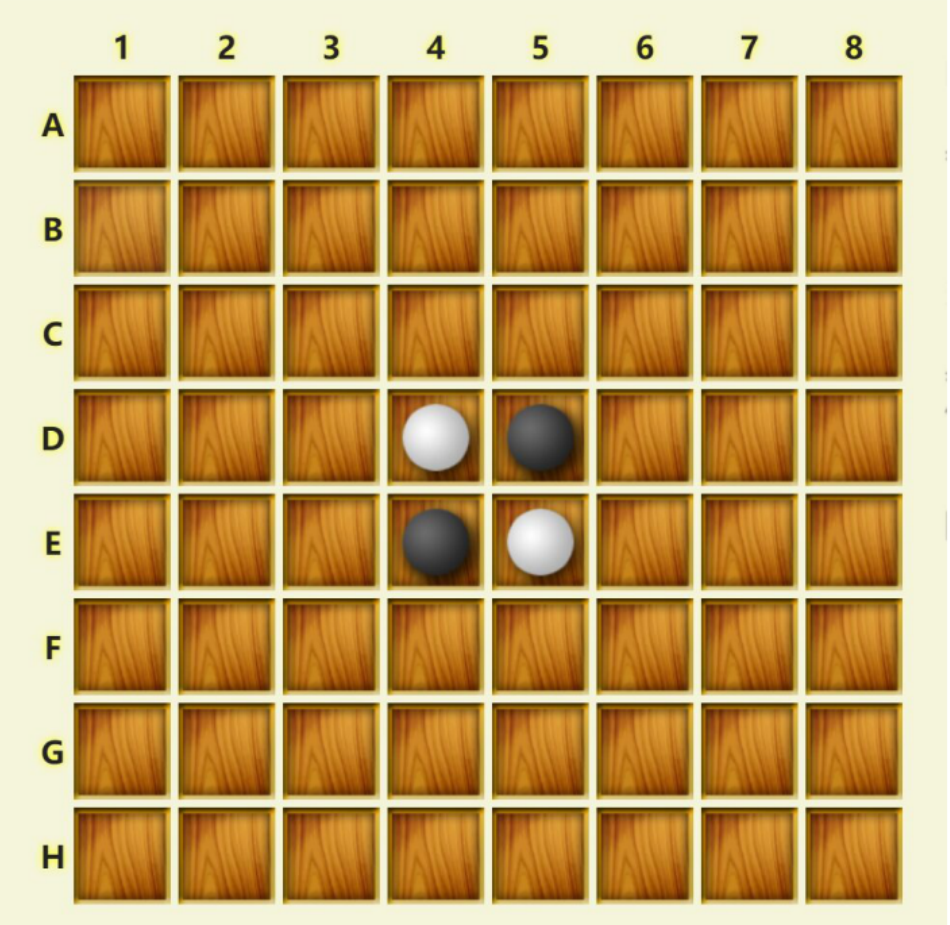


Fig 1 Othello chessboard

Today, Jimmy and Alpaca are playing Othello again. Please tell them the final board after playing chess.

Input

The first line is an integer `N` , which means a total of `N` moves were made.

The second line is an integer `color` , indicating the `color` of the first move.

For the following `8` rows, there are `8` numbers in each row, representing the input 8*8 board.

For the next `N` rows, each row consists of two integers `x` and `y`, indicating the position of the move.

- Don't forget to test if the move is valid, if a input move `Move` is invalid, output the chessboard before this invalid `Move`.

`N` <=60

Output

Output of the board after playing chess.
If an invalid move is encountered, output the board before the first invalid move.

Sample Input 1 (All moves are valid.)

```
2
-1
0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0
0 0 0 1 -1 0 0 0
0 0 0 -1 1 0 0 0
0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0
2 3
4 2
```

Sample Output 1

```
0  0  0  0  0  0  0  0
0  0  0  0  0  0  0  0
0  0  0  -1 0  0  0  0
0  0  0  -1 -1 0  0  0
0  0  1  1  1  0  0  0
0  0  0  0  0  0  0  0
0  0  0  0  0  0  0  0
0  0  0  0  0  0  0  0
```

Sample Input 2 (Some moves are invalid.)

```
3
-1
0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0
0 0 0 1 -1 0 0 0
0 0 0 -1 1 0 0 0
0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0
2 3
0 0
1 1
```

Sample Output 2

```
0  0  0  0  0  0  0  0
0  0  0  0  0  0  0  0
0  0  0 -1  0  0  0  0
0  0  0 -1 -1  0  0  0
0  0  0 -1  1  0  0  0
0  0  0  0  0  0  0  0
0  0  0  0  0  0  0  0
0  0  0  0  0  0  0  0
```